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COMPLETE SPECIFICATION

Meat Tenderizing Machines

We, TOLEDO SCALE COMPANY, of 5225, Telegraph Road, in the City of Toledo, County of Lucas and State of Ohio, United States of America, a corporation of the State of New Jersey, United States of America, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in meat tenderizing machines such as are employed in retail meat markets and in other establishments for tenderizing boneless steaks and for knitting smaller fragments of meat together to prepare composite steaks.

In the history of the development of meat tenderizing machines it has been found that the most efficient are those which employ co-acting rolls between which the meat to be tenderized is passed. Each of these rolls is composed of a series of disk-like knives usually having slotted peripheries which form teeth in the edges of the knives.

One of the biggest problems connected with the use of meat tenderizing machines is the problem of keeping the machine clean and sanitary. This problem involves not only the actual physical cleaning of those portions of the machine which contact the meat, and, in particular, the meat cutting knives themselves, but also the maintenance of the machine in a sanitary condition between periods of use and during use. This consideration of cleanliness involves several factors. Primary among these is the fact that when the meat is passed between the co-acting knives the knives themselves often catch on tendons and sinews in the meat and, instead of severing them tear them bodily from the meat. It has been found that this action takes place in all prior machines (regardless of the particular shape of the knives themselves). It also has been found that when the tendons or sinews are drawn from the meat they are wrapped tightly

around the arbors on which the knives are mounted. Removing these tightly wrapped sinews is a difficult task. Most operators remove them by holding the roll in one hand and working the sinews loose from between the knives with an instrument such as an ice pick until one end of the sinew can be grasped in the fingers and the sinew unwound from around the arbor. Because the peripheral edges of the knives are exceedingly sharp, this operation often results in numerous cuts in the hand holding the knife roll.

Another difficulty in cleaning known machines arises from the fact that the tenderizing knife rolls are located in the interior of the machine and are rotated by a power drive. Thus, to remove the knife rolls it is necessary to open the machine housing and to disengage the knife rolls from the power drive. The provision of this disengagement requires the use of displaceable journals for at least one end of each knife arbor and a slotted or other disengageable drive between the other ends of the knife arbors and the power drive means. When such a knife roll is to be removed from the machine the only way that the roll can be held is by grasping it as a whole so the sharp edges of the knives again are likely to cut the hand.

In order to clean the knife rolls in prior machines each of them must be individually removed from the body of the machine and, as explained, both in the removing and cleaning operation danger of injury constantly exists. Furthermore, the interior of that portion of the housing in which the knife rolls are located must be cleaned periodically because the cutting, ripping and tearing action of the knives throws small bits of meat, sinew and fat onto the walls of the housing. Because of the danger that water would penetrate into other portions of the housing and damage either the transmission or the power motor, the interiors of the knife roll portions of the housings of prior art

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devices have had to be wiped clean and could not be washed by being held beneath a hot water faucet.

It has long been known that if those portions of meat handling machines which come into actual contact with the meat can be kept under refrigeration between periods when they are in actual use, the growth of mold spores and bacteria can be greatly inhibited and the machines maintained in a more nearly sterile condition. In prior meat tenderizing machines it is relatively impracticable to try to keep the machines under refrigeration between periods of operation because they are too heavy to be carried in their entirety from the place where they are used to the refrigerator and stored therein. Furthermore, even if the prior machines were carried to and fro and kept in the refrigerator when not in use, the results would be bad from another angle. Because the prior machines are not designed for rapid and safe disassembly not only the meat contacting portions of such machines would be kept under refrigeration but also those portions on which refrigeration would be both unnecessary and undesirable.

The principal object of the present invention is the provision of a meat tenderizing machine in which not only the operation of the machine, but also the maintenance of the machine in the most nearly sterile condition possible, is simplified.

Thus in a meat tenderizing machine embodying the invention the thorough cleaning of the meat contacting portions of the machine can be easily effected, the removal of sinews and tendons is simplified, the meat cutting knives may be thoroughly scalded under running hot water and the necessity of grasping the extremely sharp knives with the hand is eliminated.

The invention consists in a meat tenderizing machine having a meat tenderizing mechanism detachable as a unit from the remainder of the machine and comprising tenderizing knife rolls mounted in a unitary frame.

Referring now to the accompanying drawings:

Figure I is a perspective view of a meat tenderizing machine embodying the present invention.

Figure II is a perspective view of the machine shown in Figure I but with the meat tenderizing mechanism removed.

Figure III is a perspective view of the meat tenderizing mechanism which is omitted from the perspective view shown in Figure II.

Figure IV is an isometric view on an enlarged scale of the tenderizing knife

rolls and the unitary frame in which they are mounted.

Figure V is a vertical sectional view, certain parts being broken away, of the meat tenderizing machine shown in Figure I.

Figure VI is a horizontal sectional view taken substantially on the line VI—VI of Figure V.

Figure VII is a fragmentary vertical sectional view on an enlarged scale and showing the transmission and knife arbor bearings of the machine shown in Figure V.

Figure VIII is a fragmentary view partly in section taken substantially on the line VIII—VIII of Figure VII.

Figure IX is a fragmentary vertical sectional view on an enlarged scale taken substantially on the line IX—IX of Figure VII.

Figure X is a vertical sectional view taken substantially on the line X—X of Figure VII.

Figure XI is a fragmentary elevation of the upper portion of the machine as shown in Figure II.

Figure XII is a still further enlarged detail view of latching means employed in the machine embodying the invention.

Figure XIII is an enlarged vertical sectional detailed view taken substantially on the center line of one of the knife bearing arbors employed in a machine embodying the instant invention.

Figure XIV is a view in elevation of one of the knives employed in the tenderizing knife rolls.

Figure XV is a sectional view taken substantially on the line XV—XV of Figure XIII.

The meat tenderizing machine shown in the drawings has three main units. These units are the driving unit, the meat tenderizing unit and the machine base. These units each have a separate removable housing element, which elements together form a continuous outer housing for the machine. The three enclosing elements are a motor housing 1, a knife roll canopy 2 and a receiving tray 3, the latter two being easily detachable from the machine for cleansing or other purposes. The motor housing 1 is shaped substantially like a semiparaboloid. The machine is assembled on a base casting 4 (see Figure VI) at one end of which are four upwardly extending pillars 5 on the upper ends of which a driving motor 6 is vertically mounted. The pillars 5 are of such height that a standard motor, i.e. a 110—115 volt, 60 cycle motor, can be mounted thereon and will extend upwardly a sufficient distance so as to permit a gear housing 7 to be secured on its upper end and

form the support for the knife roll canopy 2 and the mechanism contained therein.

If a motor of other characteristics, say for example, a 25 cycle motor, is employed, it also may be vertically mounted on the pillars 5 even though the frame of a 25 cycle motor is substantially longer than that of a 60 cycle motor. The longer frame of the 25 cycle motor is indicated in Figure V by the dotted lines labeled 6a. The only requirement for such substitute mounting is that the pillars 5 be shortened by a simple machining operation so that the upper end of the longer motor extends the same distance above the base 4 as the upper end of a shorter 60 cycle motor. Conversely, if a motor smaller than the 110 volt motor is employed, as for example, a D.C. motor, a spacer may be inserted between the upper ends of the pillars 5 and the motor to raise the upper end of the motor to the same level above the base 4 as the upper end of a standard 60 cycle motor when mounted on the pillars alone.

On the upper end of the frame of the motor 6 there is formed a flat annular flange 8 to which is secured by means of bolts 9 a similar flange 10 formed on the gear housing 7 (see also Figures VII, VIII and IX). The gear housing 7 also has an upwardly extending arch-shaped wall 11 (Figure XI) in the lower portion of which a pair of bosses 12 are formed. The housing 7 is provided with a chamber 13 to contain lubricant and also the transmission members, which chamber is closed by a cover 14. The chamber 13 is so designed that it has an opening at an angle to the horizontal of approximately 45 degrees so that when the cover plate 14 is removed access to the chamber 13 is afforded either from the side or from the top.

A shaft 15 (Figure IX) of the motor 6 extends upwardly through the center of the flanges 8 and 10 and through the center of a cup 16 which is formed in the base of the housing 7. The upper end of the shaft 15 is turned to a diameter smaller than its main diameter and a worm 17 is mounted thereon. The worm 17 has a hub 18 on its upper end through which there is cut a slot 19. A short rectangular key 20 extends through the slot 19 and into a keyway 21 cut in the reduced diameter portion of the shaft 15. The key 20 is held in the slot 19 and keyway 21 by a split retaining ring 22. The worm 17 is retained on the shaft 15 by a nut 23 which is threaded on its uppermost end and bears down on a washer 24 interposed between the nut 21 and the end of the hub 18.

Two worm gears 25 and 26 are in mesh

with the worm 17. The worm gears 25 and 26 are keyed on the ends of worm gear shafts 27 and 28, respectively, and are held on such shafts by washers 29 secured to the shafts by machine screws 30 which are threaded into the ends of the shafts 27 and 28. Each of the shafts 27 and 28 is journaled in a sleeve bearing 31 which is mounted in one of the bosses 12. The inner ends 32 and 33 of the shafts 27 and 28 extend through the bosses 12 and to the other side of the wall 11 opposite from the transmission gearing just described. A transverse slot 34 is cut in each of the ends 32 and 33 of the shafts 27 and 28 and a collar 35 is pinned on each of the ends 32 and 33. A washer 36 is located between each of the collars 35 and the end of its associated sleeve bearing 31. The shafts 27 and 28, as will be set forth later, constitute the driving means for the tenderizing knife rolls.

In Figure IX there is shown oil retaining means which comprises a sleeve 37 and an oil thrower 38. The sleeve 37 surrounds the shaft 15 being forced and sealed in the flange 10 so that it extends above the edges of the cup 16 and prevents oil which collects in the cup 16 from running down the shaft 15 into the motor 6. The oil thrower 38 is shaped like an inverted cup but has a flange bent backwardly and upwardly around its main cup-shaped body. It is secured to the shaft 15 by being pinched between the lower edge of the worm 17 and a shoulder 39 on the shaft 15 which exists where the small diameter portion of the shaft starts. Thus, when the shaft 15 rotates the oil thrower 38 rotates with it and, since both its inner and outer wall are cone-shaped, oil is carried away from the upper edge of the sleeve 37 downwardly into the cup 16 and thence is thrown up and out of the cup 16 onto the worm gears 25 and 26 to lubricate such gears and the worm 17.

The provision of an angular opening into the chamber 13 permits the shafts 27 and 28 to be inserted in their bearings and the worm gears 25 and 26 to be mounted thereon from a horizontal direction and also permits the worm 17 to be dropped vertically onto the shaft 15 with the upper end of the shaft 15 extending out of the chamber 13 when the cover 14 is removed so that the key 20 is accessible. The key 20 is a shear key and, in the event that the mechanism is jammed, it is sheared to prevent damage to the gearing. Since the upper end of the shaft 15 is accessible this shear key can easily be replaced by sliding the split ring 22 vertically and removing the sheared key for replacement with a new key.

Space is available above the gear hous-

ing 7 within the upper portion of the housing 1 for the mounting of a capacitor for the motor 6 if that type of motor is employed. In Figure VII a capacitor is shown in dotted lines as it would be mounted on the rear of the wall 11.

The receiving tray 3 is a unitary detachable structure which overlies the base 4 and has an upwardly extensive portion which cooperates with the housing 1 to enclose the motor 6 and gear housing 7. The tray 3 is secured on the base 4 by means of a resilient clip 40 (Figure V) which is engaged in a slot 41 formed in the front wall of the base 4. A recess 42 is formed in the front apron of the receiving tray 3 and a toggle switch 43 which is mounted in the front wall of the base casting 4 extends into the space formed by the recess 42. The toggle switch 43 controls the operation of the motor 6. This switch 43 is located in a recess so that it will not be closed accidentally and also so that it is accessible from the front of the machine.

The receiving tray 3 has been made easily detachable so that it can be placed in a sink for cleaning under a hot water faucet.

A unitary frame 44 (Figures IV, VII and VIII) consists of two upwardly extending curved arms 45 and 46 and an open rectangular frame 47. A tie bar 48 is secured to the upper ends of the arms 45 and 46. At the rear end of the bar 48 there is formed a hook 49 which is engageable in a square slot 50 (see also Figure II) which is formed in the arched upper portion of the wall 11. The hook 49 when engaged in the slot 50 supports the frame 44 on the machine.

The open frame 47 has a front wall 51 in which are formed two bosses 52 and a rear wall 53 in which are formed a pair of semicircular grooves 54 so located as to be coaxial with the bosses 52. A pair of knife arbors 55 and 56 are journaled at their front ends in sleeve bearings 57 which are located in the bosses 52. The rear ends of the arbors 55 and 56 (see also Figure XIII) are formed with flat tenons 58 which are engageable in the slots 34 cut in the ends 32 and 33 of the shafts 27 and 28. When the tenons 58 are so engaged in the slots 34 the transmission earlier described rotates the arbors 55 and 56 toward each other (as shown by the arrows in Figure X).

The tenderizing knife rolls are formed by mounting on each of the arbors 55 and 56 a plurality of toothed disk-shaped knives 59 which are formed with a centrally located hole 60 (Figure XIV) into which extends a small key 61. Each of the arbors 55 and 56 has two keyways 62

and 63 cut longitudinally in its periphery, the two keyways being located at slightly more than 180 degrees from each other. The knives 59 are assembled on the arbors 55 and 56 in the following manner. At the rear end of each of the arbors 55 and 56 there is pinned a sleeve 64. A knife with its key 62 in one of the keyways 62 or 63 is slid onto the arbor and up to the forward end of the sleeve 64. This is followed by an annular spacer 65 and the spacer 65 in turn by a second knife 59. The second knife 59, however, has its key 61 in the other of the two keyways 62 and 63 in order that the teeth of adjacent knives are always staggered with relation to each other (see Figure XV). Knives 59 and spacers are alternately placed on the arbors 55 and 56 with the knives being keyed in the two keyways 62 and 63 alternately until the required number of knives 59 and spacers 65 have been assembled on the arbors 55 and 56. Near the front end of each of the arbors 55 and 56 there is a reduced diameter threaded portion 66 onto which is threaded a nut 67 to hold the knives and spacers on their arbor. The extreme front end of the arbor 55 or 56 is still further reduced in diameter and extends into one of the sleeve bearings 57 which is secured in its boss 52 by a transverse set screw 68. A thrust button 69 extends into the end of each of the bearings 57. The bearings 57 are formed with semiannular lips at their rear ends.

As can be seen in Figure IV the two arbors 55 and 56 are parallel and are mounted in the unitary frame 44 for support when that frame is removed from the machine. The position of the rear tenoned ends of the arbors 55 and 56 with respect to the slotted shafts 27 and 28 with which they cooperate is adjustable by loosening a pair of screws 71 which secure the tie bar 48 to the upper end of the arm 45. This is done with the hook 49 engaged in the slot 50 and the unitary frame 44 in the position in which it occupies when assembled on the remainder of the machine. After the adjustment has been made so that the tenons 58 engage freely in the respective slots 34, the screws 71 are tightened, a hole is drilled through the bar 48 into the arm 45 and the two members are secured to each other by a taper pin 72 driven therein.

The angular relationship between the unitary frame 44 and the wall 11 from which it is hung and thus, with the remainder of the machine, is adjusted and maintained by the following parts. A stud 73 is mounted in a boss 74 formed in the lowermost portion of the wall 11 and held therein by a set screw 75 which

extends upwardly through a formed apron 76 on the lower portion of the wall 11. The forward end of the stud 73 extends into a hole 77 which is bored through the rear wall of the frame 47 to position the unitary frame 44 and secure it against transverse movement. A latch 78 (Figure XII) is pivotally mounted on a screw 79 threaded in the rear side of the wall 53 and has an arcuate notch 80 cut in its edge. The latch 78 is flat and when in its upward or locked position extends into a slot 81 cut transversely in the stud 73. When the latch 78 is in its lower or unlatched position (as shown in the dotted lines in Figure XII) the arcuate notch 80 is in line with the stud 73 and the unitary frame 44 can be removed from its assembled position (as shown in Figure VII).

When the arbors 55 and 56 are engaged in their respective drive shafts 27 and 28 a slight clearance exists between the sleeves 64 and the grooves 54 (see Figure XII) so that no friction is created by rubbing contact between the sleeves 64 and the end wall 53. However, when the latch 78 is unlatched and the unitary frame 44 removed from its assembled position (as shown in Figure IV) the weight of the arbors 55 and 56 causes them to drop this slight distance so that the sleeves 64 rest in the grooves 54. An arbor retaining latch 82 is pivoted by a thumb screw 83. The latch 82 has a longitudinal slot 84 through which the thumb screw 83 extends. The thumb screw is threaded into a boss on the top of the end wall 53 and is located between the grooves 54. The latch 82 serves to retain the arbors in the unitary frame 44 when it is removed from the remainder of the machine.

By loosening the screw 83, the latch 82 can be swung horizontally and slid rearwardly on the screw 83. This permits the tenderizing knife rolls comprising the arbors 55 and 56 and their associated knives to be removed from the knife roll frame. This is accomplished by sliding the knife rolls longitudinally toward the end wall 53 until the opposite ends of the arbors 55 and 56 are withdrawn from their bearings 57 and are resting only on the lips 70. The tenderizing knife rolls then can be lifted vertically out of the unitary frame 44.

A pair of guide members 85 and 86 are provided to guide the meat being treated between the knives 59 mounted on the two arbors 55 and 56 and to prevent such meat from wrapping around the tenderizing knife rolls. Each of the members 85 and 86 (shown most clearly in Figures VII and X) consists of a cross bar 87 in which are mounted a plurality of

wires 88 that extend at right angles to the bar 87 and are so bent as to fit upwardly between adjacent ones of the knives 59 on the particular arbor with which the respective member 85 or 86 is associated. The cross bars 87 are each mounted in a pair of clips 89 which are secured to the inner surfaces of the end walls 51 and 53 of the knife roll frame 44.

By constructing the guides so they extend laterally to the sides of the frame 47, two objectives are achieved. This prevents pieces of meat from being dragged around the ends of the wires 88 and back onto the knives 59 if a long tough sinew becomes snagged on one of the teeth of one of the knives and also provides a guarding grid for the open bottom of the meat tenderizing mechanism to prevent anyone from accidentally inserting his hand in back of the rotating knives 59. The wires 88 are resilient so that they will flex slightly against the pressure of the meat passing therebetween and are of circular cross section for two reasons; one, by rubbing against the knives 59 they keep the edges of the knives sharp; two, the circular cross section offers less resistance if one of the wires 88 is bent transversely and is struck by a tooth of one of the knives 59. When this occurs the circular cross section will tend to cam the wire out of the way and will not catch the tooth of the knife thus preventing damage either to the knife or the wire. The members 85 and 86 may be inserted from beneath the unitary frame 44 when it is in its assembled position (as shown in Figure VII) or if preferred, they may be inserted when the frame 44 is out of the machine by rocking the frame backwardly onto its upwardly extending arms 45 and 46 to permit access to the under side of the knife rolls.

The motor housing 1 is mounted on the base 4 by means of three mounting brackets 90 (Figures V and VI) which may be spot welded, for example, to the interior surface of the housing 1 and which are secured to the base 4 by screws 91. The curvature of the open front end of the motor housing 1 follows the same arch as does the periphery of the arch-shaped wall 11, which is constructed integrally with the casting forming the transmission housing 7. An extruded or otherwise formed beading 92 which has a substantially H-shaped cross section is secured at the sides of the base casting 4 by screws 93 (Figures V and VI). The molding 92 is supported in its arch around the forward edge of the housing 1 and over the periphery of the wall 11 by a flat strip 94 to which it is secured in some manner such as welding. The strip 94 braces the mold-

ing 92 and also braces the forward edge of the housing 1 where it does not overlie the periphery of the wall 11. A vertical notch 95 is formed in each side of the base casting 4 to accommodate the strip 94. The outer arm of the H-shaped beading 92 is curved and overlies the outer surface of the edge of the housing 1 to hide the metal edge and give a finished appearance to the exterior of the machine.

Similarly, the vertical edge of the upwardly extending portion of the receiving tray 3 are located between the other pair of arms of the H adjacent those into which the housing 1 extends and the beading 92 covers this edge also. As can be seen most clearly in Figure II, the horizontal upper edge 96 of the upwardly extending portion of the receiving tray 3 is curved to the same contour as that of the apron 76 formed at the lower portion of the wall 11 so that a substantially continuous surface is presented by the upper portion of the receiving tray 3 and the apron 76 of the wall 11 when the meat tenderizing mechanism is detached as a unit from the remainder of the machine. This permits the exposed mechanism to be wiped clean and prevents the accumulation of dirt at this junction point.

The knife roll canopy 2 which is detachable from the meat tenderizing mechanism consists of a formed metallic sheet which has a longitudinally extending throat 97 formed in its ridge. The transverse shape of the canopy 2 (as can be seen by comparing Figures X and XI) is substantially the same as the shape of the arched periphery of the wall 11. The front end of the canopy 2 (Figure I) is substantially vertical with a slight horizontal curvature to match the curvature of the front apron of the receiving tray 3. The height of the canopy 2 is, of course, dependent upon the shape of the housing 1 and wall 11 but all these have been designed so that the distance from the throat 97 to the upper edges of the knives 59 is more the length of the fingers of a man's hand in order to prevent anyone from being injured by inserting the fingers into the throat 97.

The canopy 2 is mounted on the unitary frame 44 and supported thereby. A lip 98 of the throat 97 overlies the tie bar 48 of the unitary frame 44 and supports the canopy 2 over such frame. The rear open end of the knife roll canopy 2 extends between the same arms of the H-shaped beading 92 as does the rear edge of the slice receiving tray 3, again, therefore presenting the same smooth contour on its exterior. The canopy 2 is held in place over the unitary frame 44 by means of a latch comprising a formed bracket 99 (Figures IV, VII and VIII) which is

attached to the front wall 51 of the open frame 47 of the unitary frame 44. This bracket has two downwardly depending arms 100 between which there is located a spring clip 101. A small clip 102 which may be spot welded on the interior of the canopy 2 snaps between the bracket 99 and the clip 101 when the canopy 2 is in place over the unitary frame 44. The canopy 2 is removable from its assembled position over the frame 44 by being longitudinally slid (to the right in Figure VII) a sufficient distance to disengage the clip 102 from the spring clip 101 and to disengage the rear edge of the canopy 2 from the outer arm of the H-shaped beading 92. When the canopy 2 has been moved longitudinally a sufficient distance so as to disengage these parts (the lip 98 sliding along on the tie bar 48) it may be lifted vertically free of the unitary frame 44.

The meat tenderizing mechanism is a unit which comprises the knife roll frame 41, the tenderizing knife rolls, and the canopy 2. This mechanism extends laterally from the upper portion of the remainder of the machine so that the meat is discharged from such mechanism into an open area which is accessible from more than one side of the machine. The receiving tray 3 also extend laterally of the remainder of the machine but from a lower portion thereof, so as to underlie the meat tenderizing mechanism. The meat tenderizing mechanism is detachable from the remainder of the machine so that it can be placed under refrigerated storage, or for other reasons. To detach the meat tenderizing mechanism, it is necessary only to disengage the stud 73 Fig. 7 from its hole 77 and the hook 49 from its slot 50. In order to disengage these members the canopy 2 and the unitary frame 44 must be pivoted on the hook 49 in a counterclockwise direction (Figure VII) to withdraw the stud 73 from the hole 77 and the tenons 58 from their slots 34. If this swinging movement took place with the canopy 2 in its assembled position, it would crush the upper portion of the rear edge of the canopy 2 against bead 92 in which it is inserted. Therefore, the latch 78 which must be swung to open position in order to free the frame 44 from the stud 73 is so placed that it cannot be swung into its open position until the canopy 2 has been moved longitudinally as explained above. As can be seen in Figure XII the latch 78 is prevented from being swung downwardly onto its unlatched position by the wall of the canopy 2. However, when the canopy has been slid forwardly the arm of the latch 78 will clear the wall and it can be swung downwardly until it is stopped by bolts

103 one of a pair of which are adjustably threaded into the end wall 53 near its ends (see also Figure VII and VIII). When the latch 78 has been unlatched the entire meat tenderizing mechanism can then be swung, as explained, in a counter-wise direction to free the arbors 55 and 56 from their driving means (shafts 27 and 28). As soon as the arbors are so disengaged the meat tenderizing mechanism can be bodily lifted and moved forwardly to disengage the hook 49 from the slot 50.

The bolts 103, which are located at opposite sides of the open frame 47, serve as adjustable stops to position the unitary frame 44 as a whole. In Figure VII and VIII, it can be seen that the head of each of the bolts 103 rests against one of a pair of pads 104 (see also Figure XI) to effect this positioning.

The open frame 47 of the unitary frame 44 is provided with four depending feet 105 which extend slightly below the lower edge of the canopy 2 (Figure X) and support the weight of the meat tenderizing mechanism when it is removed from the remainder of the machine and placed on a shelf or other independent support.

After the meat tenderizing mechanism has been removed from the machine, the canopy 2, as explained above, can be lifted vertically off the unitary frame 44 exposing the knives 59 and the open frame 44 for cleaning. After the canopy 2 has been removed from over the unitary frame 44 the guides 85 and 86 are disengaged from their clips 89 and withdrawn from between the knives 59. Then the unitary frame, still carrying the knife rolls, can be placed in a sink and hot running water can be turned onto the knives to wash away accumulated debris.

In order to facilitate the removal of this debris from between the knives, each knife has two transverse apertures 106 (Figures XIII, XIV and XV) formed in its body and located 180 degrees from each other, one on each side of the center line. These apertures 106 are of such size that even though the knives are in staggered relationship on their arbors, i.e. their keys 61 are alternately in the two keyways 62 and 63 formed in the arbore 55 or 56, the apertures 106, although offset from each other, still leave two open passageways 107 extending the entire length of the knife roll. Since the thickness of that portion of the knife located radially between the center hole 60 and aperture 106 is the same as the thickness of one of the annular spacers 65, this passageway 107 has a substantially flat bottom. Thus, any tendons or sinews which may become tightly wrapped around the spacers 65

between adjacent ones of the knives 59 are exposed to view down the passageways 107. These tendons readily can be removed after being severed through the use of a hook-shaped implement 108 (Figure XIII) which is insertable from either end of the knife roll. The implement is inserted in the passage way 107 from the end and moved past the tendon which it is desired to sever and then moved backwardly hooking the tendon with its sharp edge 109 and severing it. Since the knife rolls may be placed directly in a sink, the force of hot water directed against the rolls will then clean the tendon out from between the blades and the difficult and dangerous job of removal is obviated. It should be noted that the outside diameter of the bosses 52 and of the sleeve 64 has been maintained substantially identical with that of the spacers 65 to facilitate the insertion of the implement 108 from either end of the knife rolls.

It thus becomes entirely unnecessary to handle the tenderizing knife roll directly since they can be carried to and from the machine in the unitary frame 44, can be washed while in the frame 44 and even can be cleaned of sinews and tendons while in the frame 44. This is a highly advantageous feature since not only is all danger of cutting the hands eliminated, but also the edges of the knives are kept in better condition than if they were handled and bumped around in a pan or sink, which would bend the teeth and dull their edges.

Furthermore, the unitary frame 44 itself also can be washed beneath a hot water faucet. It may be necessary to tin or otherwise protectively coat the frame 44 and its component parts in order to prevent oxidizing from the action of water on the metal. Similarly the interior of the canopy 2 can be flushed clean if it is protectively coated.

The unitary frame 44 is carried by the tie bar 48 from which it is suspended. Also, when the meat tenderizing mechanism has been detached from the remainder of the machine it can be moved from the counter where the machine is used to a refrigeration, for example. The entire meat tenderizing mechanism can be carried in one hand simply by inserting the fingers in the throat 97 and hooking them beneath the tie bar 48. This also is done to detach the meat tenderizing mechanism as a unit from the remainder of the machine.

In reassembling the machine the guides 85 and 86 may be reinserted between the knives 59 before the canopy 2 is lowered over the unitary frame 44 if desired. The canopy 2 is then lowered over the frame 44

in its outer or unlatched position and the tie bar 48 grasped through the throat 97. The meat tenderizing mechanism is then lifted, the hook 49 inserted through the slot 50 and the meat tenderizing mechanism swung downwardly until the ends of the tenons 58 either move into their respective slots 34 or abut the ends of the shaft 27 and 28. If the tenons are not in line with their respective slots the motor can be rotated with the weight of the meat tenderizing mechanism holding the tenoned ends of the arbors 55 and 56 against the ends of the shaft 27 and 28 and, as each slot lines up with its respective tenon, this weight will pivot the entire mechanism on the hook 49 and allow the tenons to drop into their slots one by one. The motor is then shut off. At the time the tenons 58 drop into their slots 34 the stud 73 also enters its positioning hole 77 and the latch 78 may be swung upwardly into its locked position thus securing the meat tenderizing mechanism on the machine with the latch 78 up out of the way. The canopy 2 is then slid longitudinally into the locked position.

We are aware of British Patent Specification 600,257 (Berkel & Parnall's slicing Machine Manufacturing Company Limited, and anr.,) which was applied for but not published until after the date of the present Application and which claims, *inter alia* :—

“ A meat tending machine comprising a pair of knife roll assemblies, each assembly having spaced apart knives mounted on a shaft, the knives of one assembly protruding into the spaces between the knives in the other assembly, releasable bearings for said shafts whereby the knife assemblies may be removed from the machine when released from the bearings, a detachable stripper for each knife assembly and comprising a plurality of spaced apart bars extending between the knives of respective knife rolls, each stripper having a continuous upper frame and a continuous lower frame to which the bars are secured in spaced part relationship, and downwardly extending hooks on the strippers and adapted to receive and hold the knife assemblies when released from their bearings, the arrangement being such that a knife assembly and stripper may be removed from the machine as a unit when the stripper is detached.”

The present claims are essentially directed to a meat tenderizing machine having a meat tenderizing mechanism detachable as a unit from the remainder of the machine and comprising tenderizing knife rolls mounted in a unitary frame, and no claim is made in any of the claims

of the aforesaid Patent Specification 600,527 to this feature, nor to the substance of any of the subsidiary claims of the present Application when considered in conjunction with the Claim 1 to which they are all appendant.

We are also aware that a meat tenderizer and cutter has been previously proposed comprising an outer casing with parallel revoluble spaced crushing gears, the casing having lugs whereby it may be secured to the table. Such a device would need to be moved *in toto* from the table in order to be placed away in refrigeration and no tenderizing mechanism detachable as a unit from the remainder of the device was proposed.

Having now particularly described and ascertained the nature of our said invention and the manner in which the same is to be performed, we declare that what we claim is :—

1. A meat tenderizing machine having a meat tenderizing mechanism detachable as a nut from the remainder of the machine and comprising tenderizing knife rolls mounted in a unitary frame.

2. A meat tenderizing machine according to claim 1 in which the remainder of the machine has mounted therein the driving means for the tenderizing knife rolls, the latter being engageable with and disengageable from such driving means when the unitary frame of the meat tenderizing mechanism is attached to and detached from the remainder of the machine.

3. A meat tenderizing machine according to claim 1 or 2 in which the meat tenderizing mechanism extends laterally from the upper portion of the remainder of the machine so that the meat is discharged from the meat tenderizing mechanism into an open area which is accessible from more than one side of the machine.

4. A meat tenderizing machine according to claim 3 in which a receiving tray also extends laterally of the remainder of the machine, but from a lower portion thereof, so as to underlie the meat tenderizing mechanism.

5. A meat tenderizing machine according to claim 2 in which the remainder of the machine includes a gear unit carried by the upper end of a vertically mounted motor, said gear unit having mounted in a wall thereof the driving means for the tenderizing knife rolls and containing gearing through which the shaft of the motor is connected to said driving means.

6. A meat tenderizing machine according to claims 4 and 5 in which the motor is mounted on and extends vertically from a horizontally extending base on a part of

which is erected a housing which, together with an upwardly extending portion of the receiving tray which overlies another part of the base, encloses the motor and the gear unit carried thereby.

7. A meat tenderizing machine according to claims 5 and 6 in which the wall of the gear unit in which is mounted the driving means of the tenderizing knife rolls, extends vertically and has its exterior surface in substantial conformity with the surface contour of the upwardly extending portion of the receiving tray.

8. A meat tenderizing machine according to claims 5, 6 or 7 in which the motor is mounted on the base by means which permits motors of differing lengths to extend upwardly the same predetermined distance with respect to the base.

9. A meat tenderizing machine according to claim 8 in which the motor mounting means is constituted by pillars extending vertically from the base and machinable to reduce the distance which they extend vertically.

10. A meat tenderizing machine according to any preceding claim in which the meat tenderizing mechanism is enclosed in a canopy which is supported by the unitary frame of said mechanism and removable therefrom.

11. A meat tenderizing machine according to any preceding claim in which the unitary frame serves as a carrying means for the tenderizing knife rolls and as a support for said knives when the meat tenderizing mechanism is detached from the remainder of the machine.

12. A meat tenderizing machine according to any preceding claim in which the unitary frame supports two guide members, each of which is formed with guide wires extending between adjacent knives of a knife roll.

13. A meat tenderizing machine according to claim 12 in which the guide wires of each guide member extend from the point of support of the guide member in the unitary frame under the respective knife roll to a point past the axis thereof and are then bent upwardly in divergent relation to the wires of the other guide member.

14. A meat tenderizing machine substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 25th day of April, 1947.

LEWIS W. GOOLD & CO.,

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5, Corporation Street, Birmingham, 2.
Agents for Applicants.

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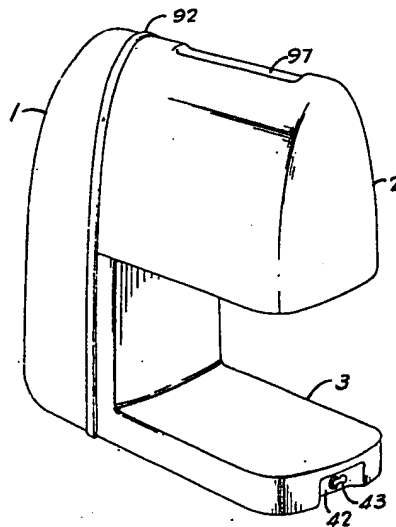


Fig. I

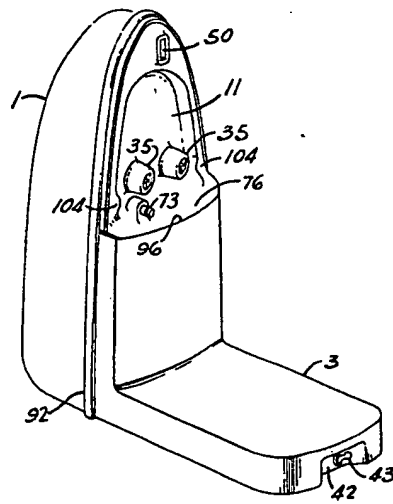


Fig. II

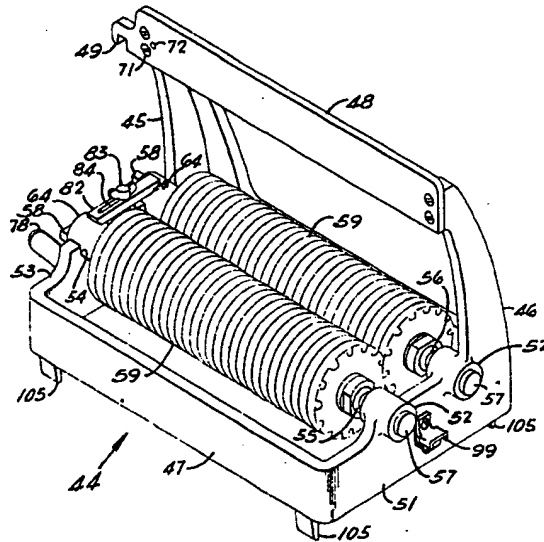


Fig. IV

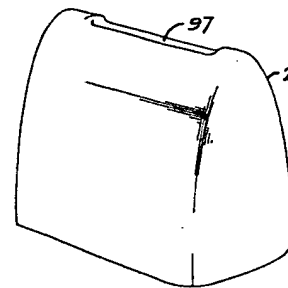


Fig. III

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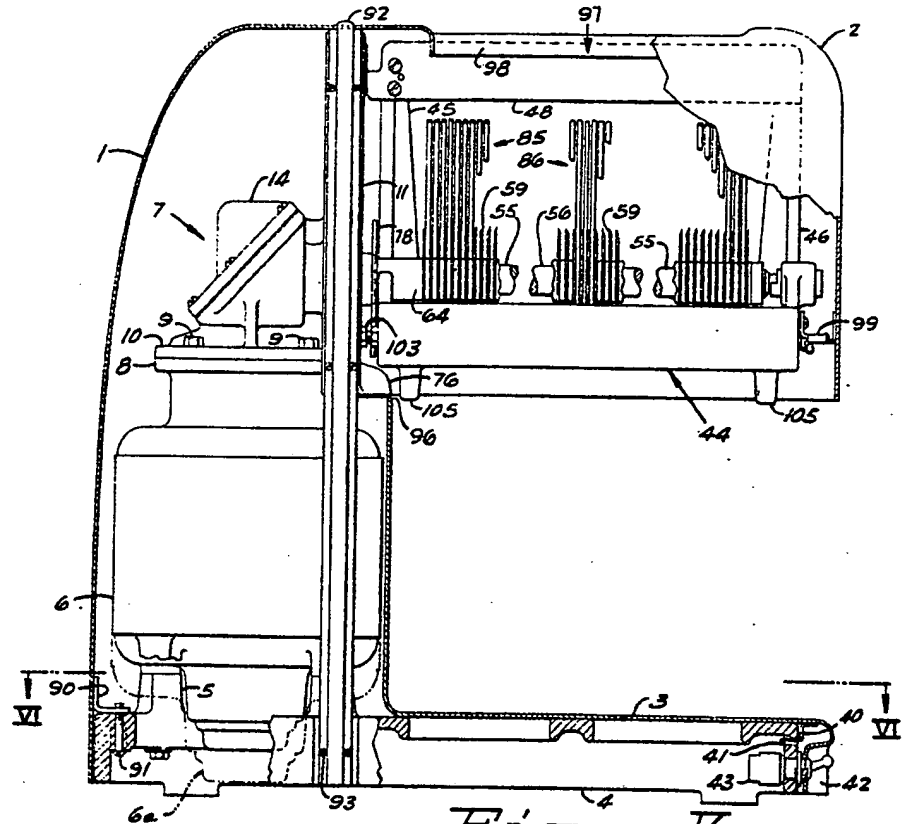


Fig. V

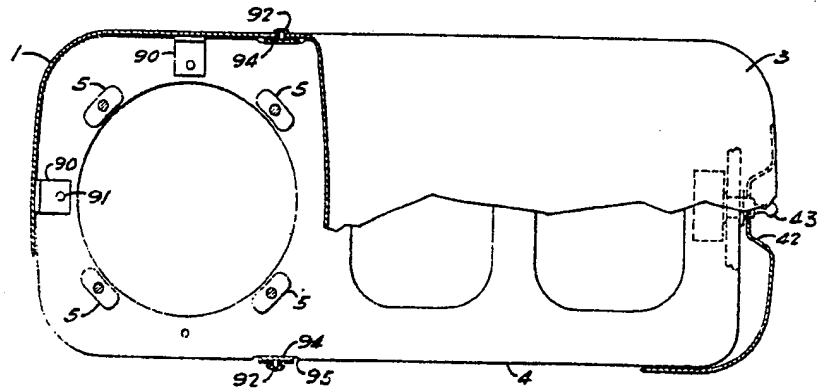
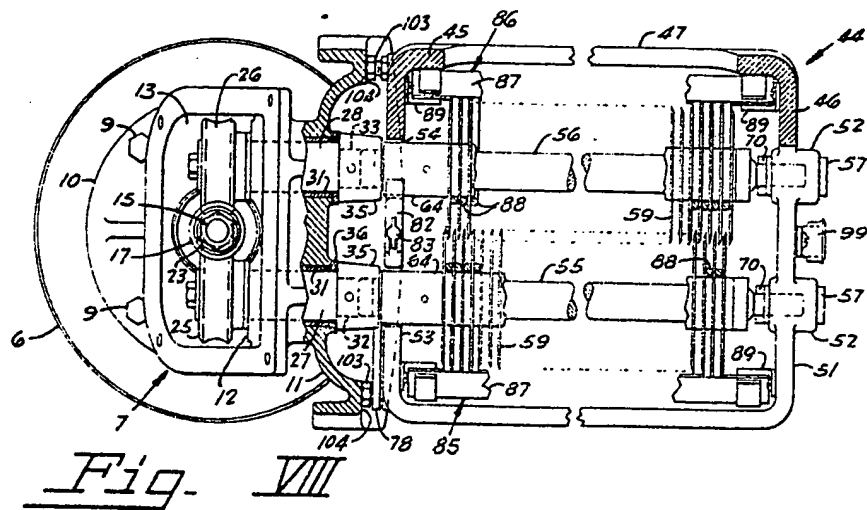
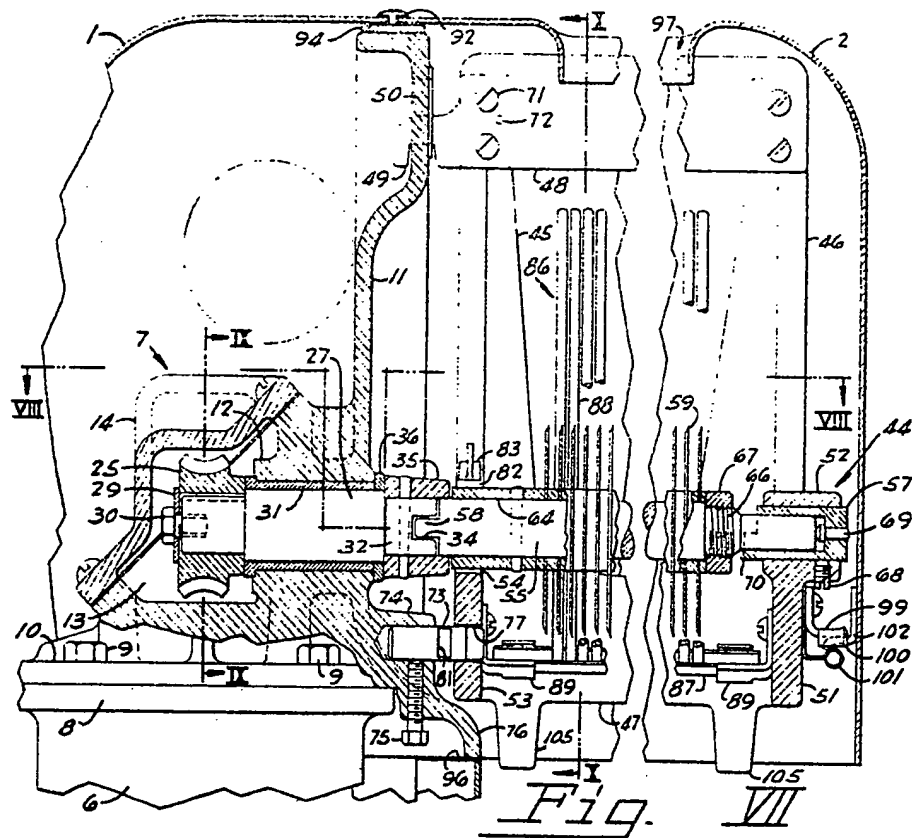
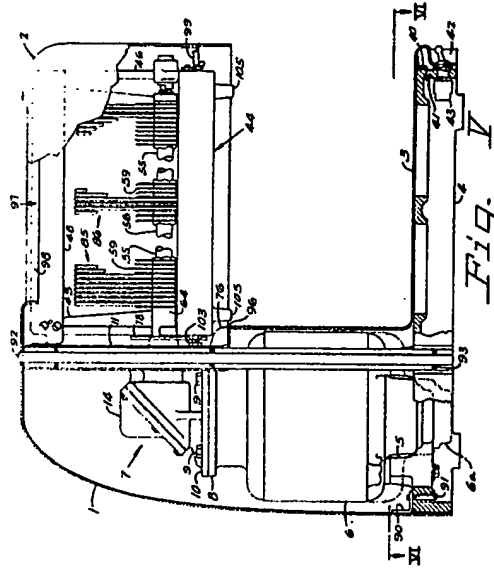
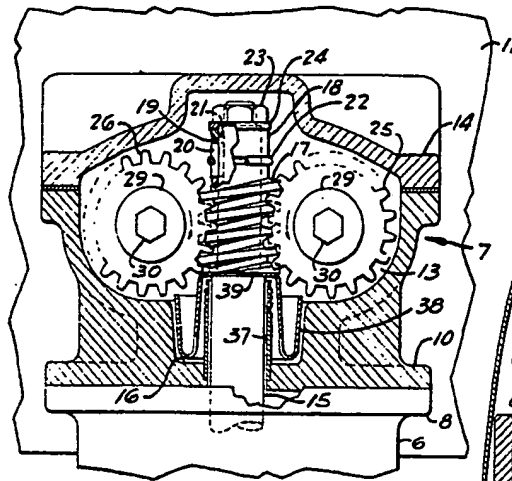
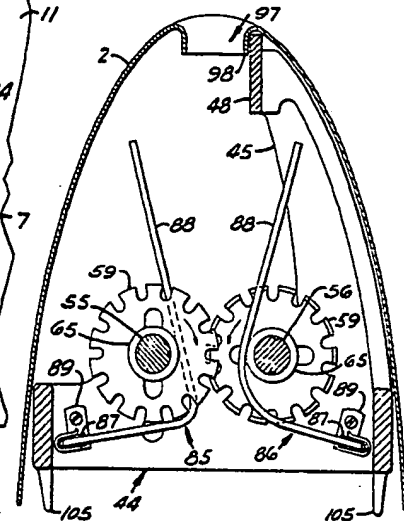
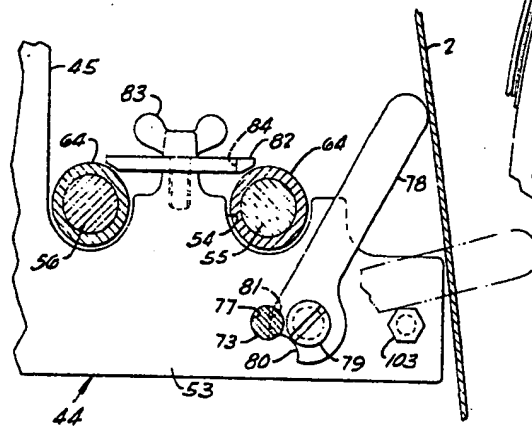
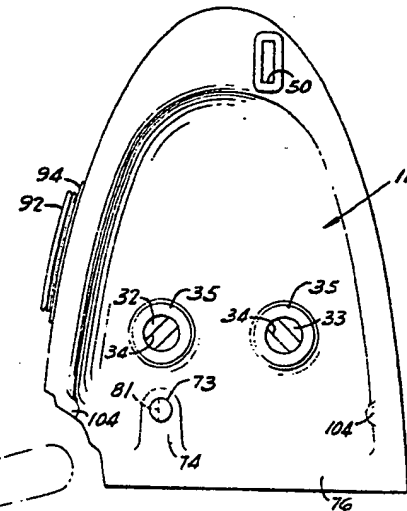


Fig. VI



[This Drawing is a reproduction of the Original on a reduced scale]



Fig. IIFig. IFig. IIIFig. IV

[This Drawing is a reproduction of the Original on a reduced scale.]

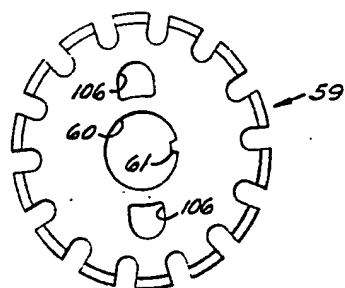
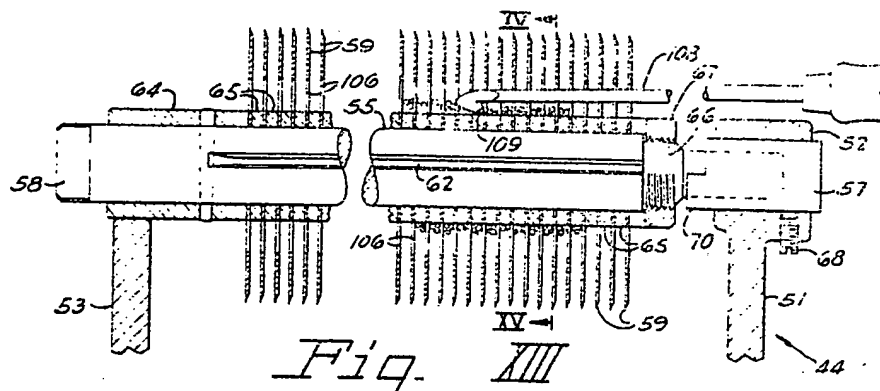
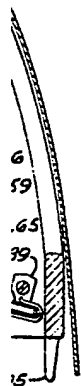


Fig. XIV

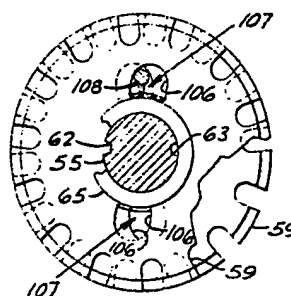


Fig. XV

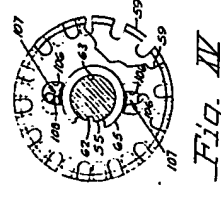


Fig. 14

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